On the Study of the Electrolysis by the Schlieren Method

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The figures in the table indicate that the percentage difference $(d_A-d_R)/d_A \times 100$ increase nearly linearly with the decreasing diameter, as disclosed by Duff (*J. Amer. Ceram. Soc.* **30** (1) 12, 1947) with a certain flint and an amber glass, as long as the latter lies in a narrow range. However, more exactly, the gradient of the curves representing the diameter–density relations increases more and more rapidly with the decreasing diameter. Although, the density differences between the annealed and the rapidly cooled samples can be explained, at least qualititatively, by the differences between the coefficients of thermal expansion above and below the transformation point.

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12. On the Study of the Electrolysis by the Schlieren Method

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By the schlieren method, some optical heterogeneities were observed photographically in aqueous solutions during electrolysis. Electrolytes used were as follows: $CuSO_4$, $ZnSO_4$, $CuCl_2$, NH_4Cl, KCl, NaCl, HCl, and NaOH. Those concentrations were held at about 0.1 N respectively. Brass plates, Pt plates, Pt wires or Hg were used as electrodes. Potential differences applied between those electrodes wre 2~10 volts and the electrodes were held 2 cm apart. The thickcess of the solution was 0.5 cm. A vertical slit was set in front of the mercury lamp, and a knife edge in front of the camera lens.

During electrolysis of $CuSO_4$ solution with brass electrodes, several striae appeared ascending from the negative electrodes, and descending from the positive one. It was considered that the ascending striae were caused by evolution of small hydrogen bubbles and the descending striae by dissolution of the positive electrode.

In the case of Pt electrodes, no downward striae were observed, but upward ones only appeared at the negative electrode. When Hg was used as negative electrode and Pt as the positive one, no striae were recognized at both electrodes, but large bubbles appeared on the Hg surface. This different types of gas evolution from the negative electrodes (Pt or Hg), were ascribed to the difference of the catalytic activity of the electrode metals.

After about 8 minutes starting electrolysis, between two electrodes, one or several streight lines appeared horizontally or diagonally. These lines show that some heterogeneous distribution of solute ions is occurring in the solution during the electrolysis. The situations of their lines are largely affected by the geometrical conditions of the electrodes. All experiments were carried out without disturbance of the solution by stirring.